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A PRELIMINARY REPORT ON FRESH-WATER INVESTIGATIONS CARRIED OUT FROM THE ATLANTIC BIOLOGICAL STATION, ST. ANDREWS, N. B.

Author

A. D. Bajkov.

A preliminary report on fr sh-water investigations carried out from the Atlantic Biological Station, St. Andrews, N. B.

by

A. D. Bajkov
(A summary of work)

At the end of October, 1933, I was transferred from the Prairie Provinces to the Atlantic Biological Station. After discussing the problems with Dr. A. G. Huntsman in Toronto, it was suggested that I would undertake an investigation of the Chamcook Lake System and probably other lakes near St. Andrews and some other investigations in connection with stocking Loch Lomond, near St. John, with game fishes. After examination of some small collections of fishes and other fresh water organisms and also stomachs of fishes secured by Dr. Huntsman in August, 1932, from Loch Lomond, the first trip to Loch Lomond was made early in November of last year.

The dammed area at Stevenson's Brook, situated near the northern shore of lower Loch Lomond, was visited by me on November 8. A new dam was erected on a small creek and just finished a short time before my visit. The flooded area at that time was not more than ¼ of an acre and the water level was approximately 4½ feet below the upper end of the dam. All the bushes on both shores of the creek just above the dam were not covered by the water. It was impossible to take any samples from this new body of water on account of the new formed ice, which was not strong enough to hold a man. The creek below the dam was examined and a small collection of aquatic insects secured. Only one young speckled trout (a year-old) was observed in this creek several yards below the dam. There was not much water in the creek at that time, the current was approximately

2-3 lt. per second (frost was since the beginning of this month) The water temperature in the creek was +0.5°C.

However, the weather changed several days after this and the dammed area was pretty well filled by November 11th when 23,000 brook trout fry, from 3½" to 4" long were placed in it. Owing to the impossible weather and road conditions the second trip to Loch Lomond was postponed until the spring.

In addition to this an extensive collection of plankton were secured from lower Loch Lomond, including 84 species (identified): Chlorophyceae - 26, Myxophyceae - 12, Flagellate protozoa etc. - 8, Rotatonia - 5, Bacillarieae - 14, Phyllopoda - 16 and Copepoda - 3. A list of species secured from Loch Lomond is prepared for further information.

Chamcook Lake System.

In regard to work on the Chamcook lakes, the general object, as was suggested, should be to determine in what way they are peculiar, that is, different from such as have been described. Also in what way anyone in the series may be peculiar. Another object is to ascertain the roles played by lake trout, the brook trout, the smelt, and perhaps the sucker and the eel in the economy of the lakes, particularly as to effects on the population of salmon.

During November about twenty trips to Chamcook lake were made. A number of gill nets of small mesh (½" - 1") were set at the surface Before the lake was frozen, no smelt were caught. However, a large school of smelt were observed near the outlet, but conditions were impossible to set a net because ice was

forming at that time; A considerable number of minnows (Couesius plumbeus) were caught in a minnow trap.

When the lake was frozen and the ice was about 3" (middle of December) a night line with about 100 hooks baited with meat and fresh herring was set for two days but no fish were caught and all the bait was untouched. (The eels at this time were already hibernating). After this, a large new gill net 3½" mesh, 40 fathoms long and 40 meshes deep, was privately obtained and set near the bottom in the southern portion of the lake at the depth of 7 fathoms. No fish were caught during two nights. After this, the net was set at different depths at one, two, three, four, five and six fathoms from the bottom respectively. No single fish was caught!

It is interesting to point out that the temperatures at that time (the second part of December) were +0.6°C from the surface to the greatest depth found (25 fathoms), and the fish probably were not moving at all. A first landlocked salmon (s. s. sebago) female, two years old was caught only after a month's fishing. In the stomach of this salmon were two small smelt (aferaging 60 - 70 mm. in length) with eggs. No scales were left on these fishes to determine the age.

In the middle of January the camp was removed to the upper end of First Chamcook Lake near the inlet from Second Chamcook. It was supposed that there must be better fishing here. The temperatures in the creek and in the lake proper were +0.6 - 0.8°C. Nets were set a hundred yards from the inlet at a depth of 5 fathoms. Considerable material on salmon of all ages and also lake

trout (Cristicomer namaycush) were secured at that place. The smallest salmon weighed 100 grams, the largest about 5 pounds. The stomachs of young salmon were filled with smelt, but the stomachs of old ones were empty. A few large fishes were caught during January and February and examination showed that some of them have still ripe eggs and milt. The stomach contents were carefully examined and filed. The cestodes and other intestinal parasites were preserved and collected for Prof. R. A. Wardle. (for identification). The scales of all fish were preserved for future examination. The accurate weights, and detailed measurements of all fishes were made for future comparison with the fishes from other regions. The same procedure was made with lake trout. The largest lake trout caught with hook and line weighed 9 pounds. It was found that the main food of salmon and lake trout is smelt.

A considerable amount of time was spent in connection with smelt investigation. As has been mentioned already a large school of smelt was observed in November near the outlet from First Chamcook Lake. All efforts to catch smelt with nets and hooks during the winter were unsuccessful.

The first school of smelt has been observed through an ice hole about a hundred yards from the mouth of inlet creek at the upper end of First Chamcook lake (lower) in the evening of February 28th. About forty of them have been caught by hook and line. The next day was warm and many of them were observed and caught through the ice. They disappeared after two days when weather became colder and came again only after ten days.

A very large school came to the mouth of inlet creek in the evenings of March 14th and 15th. The fish were nearly ripe at that time, but no spawning has been observed in the creek. The extensive runs to the mouth of the creek always takes place during the dark after sunset. The best fishing was at night with flash-light. During the day fish return to the deeper water, and keep in schools near the bottom at a depth of about 7 fathoms. A careful examination of scales of the smelt show that the main bulk of fish spawn at the end of the second year. However, there is a certain percent of one year old spawners. Among two year-old fish there is quite a large percent of "sterile fish which will spawn next year, (their sex can be determined only under the microscope). These "sterile" fish were mixed with ripe ones. Among three year-old fish no "sterile's" were found so far. The observation of the spawning run of smelt is in progress at the present time (end of March) and a detailed report on smelt will be presented in the future. Special attention will be paid to detect different races of smelt (if any) in Chamcook and other lakes. An examination of stomachs, parasites, scales etc. is in progress at the present time. Also a detailed measurement of smelt (Smith's method) of all sizes is kept for further comparison.

The average number of eggs were counted in the smelt and the results are as follows:

	Left gonads	Right gonads	Total
One year old (av. size 90 mm.)	1380	275	1655

	Left Gonads	Right Gonads	Total
Two years old (av. size 120 mm)	2500	625	3125
Three years old (av. size 142 mm.)	4900	1025	5925

The percentage of the males and females was about equal.

One smelt (male) was found in the stomach of a lake trout, its length was 190 mm., but unfortunately all the scales were digested, however, otalits and bones were preserved.

It was found that smaller smelt fed on bottom fauna (insect larvae) and the larger on small smelt and stenlebaen. It is suspected that all smelt caught belong to the larger race, and that the smaller race (plankton feeders mostly) will come later.

Plankton of Chamcook Lake (I)

Several deep and shallow water samples of plankton were secured from First Chamcook lake. It has been found that during the winter months the plankton consists mostly of Diatoms and Copepoda, representatives of the other groups are not common. The most common forms during the Winter are:

Asterionella formosa	Chroococcus limneticus
Tabellaria fenestrata	Mangestia sp.
Ahuraea cochlearis	Microcysty aeruginosa
Peridinium cinctum	Staurastrum cuspidatum
Botryococcus braunii	Kirchneriella obessa
Melosina granulata	Dictyosphaerium pulchellum
Diaptomus minutus	Staphanodiscus niagasse

Cyclops bicolor	Bosmina longirostris
Asplanchna priodonta	Ratulus lunaris
Polyanthra platyptera	Notholca longispine

etc.

Plankton of Chamcook creek not different from the same from the lake proper.

Bottom fauna of Chamcook lake (I)

It was found that bottom fauna of that lake is not rich at all. Only a few larvae of Chironomidae and Phryganeidae only were secured during the winter. It must be pointed out, however, that not very many samples were taken on account of cold weather. (Ekman dredge does not work well in cold weather) and thick ice, (which was in Feb. 32").

Bottom fauna in the creek (and probably around the shores in shallow water) is extremely rich. An extensive collection of aquatic insects larvae and other forms were secured from and under the stones. Some of them were forwarded to Prof. F Neave, University of Manitoba for identification.

Temperature condition.

Owing to the strong storms during the end of November the water in Chamcook lake was mixed very well and no difference between bottom and surface temperature have been observed. After the lake was frozen the temperature was about +0.6+0.8°C. from the surface to the bottom.

Only at the end of March temperatures of - 1.0°C and 1.1°C were observed (near the upper end of First Chamcook lake).

Proposal for the future work.

Regarding the future work it is advisable to continue an investigation on the Chamcook lake system and Loch Lomond, and if necessary some other lakes in any part of the Maritime Provinces. Both Chamcook and Loch Lomond are very important from a sporting stand-point and should be investigated thoroughly in the near future. It would be, probably, very useful also if the time will permit, to pay several short visits also to lake Utopia and other smaller lakes in the vicinity of St. Andrews for comparison, as none or a very little extra expenditure will be necessary for this work.

The main problem of Chamcook and other investigations, as far as I can see, should be a biology of game fishes and in connecti on with this several special problems as quantitative study of the plankton, bottom fauna, etc., a quantity of smelt, its food, enemies, biology etc., enemies of game fishes, hydrological and other conditions also should be studied.